ducing a colour that is natural and permanent. The exhibition of Algæ in the Botanical Gallery, which has been recently rearranged, shows an appreciable success for the red Algæ and some satisfactory results for the brown Algæ. It is proposed to present an account of these experiments shortly before one of the scientific societies.

A. B. RENDLE.

DR. J. O. BACKLUND.

ASTRONOMERS will hear with regret of the death of Dr. Backlund at Pulkova on August 29. He was a native of Sweden, having been born at Langhem, in Wermland, on April 28, 1846. He studied mathematics and astronomy at the University of Upsala, and in 1873 went to Stockholm Observatory as assistant to Prof. Gylden, whose new methods of perturbations he studied with enthusiasm. After a brief return to Upsala in 1875, he left Sweden for Russia, where he remained permanently. He was at Dorpat Observatory for three years, and in 1879 went to Pulkova as assistant to Dr. Otto Struve. On Prof. Bredichin's death in 1895 he was appointed director of the Observatory, retaining this post until his death.

Dr. Backlund is best known for his immense researches on the motion of Encke's comet, for which he received the gold medal of the Royal Astronomical Society in 1909. Encke had detected the acceleration in the comet's mean motion, which he ascribed to the action of a resisting medium. After his death in 1865 von Asten took up the research, adopting some of Gylden's methods. He was unable to represent the comet's motion by any constant value of the acceleration, and died at Pulkova in 1878 without solving the problem completely. Backlund took up the matter, receiving grants from M. E. Nobel and the Petrograd Academy of Sciences for assistance in computing the perturbations, which were redetermined from 1819 to 1891, and afterwards to 1911.

Backlund found clear evidence that sudden changes in the amount of acceleration took place in the years 1858, 1868, and 1895. He later found evidence of a fourth change about 1905; after this the acceleration had only one quarter of its value before 1858. He also studied the changes in brightness of the comet (it is generally brighter before than after perihelion), and made the tentative suggestion that its particles are flat and oriented parallel to a particular plane, so that when seen edgewise they reflect little light.

A valuable by-product was the determination of the mass of Mercury, the value being 1/9,700,000 of the sun. This mass cannot be found except by comets, for even Venus is not appreciably perturbed by Mercury. Several approaches of the comet to Mercury yielded accordant results.

Dr. Backlund showed great energy in administration; he found that the climate of Pulkova was unsuited for delicate astrophysical researches, and succeeded in establishing branch observatories at Odessa, and Feodosia, in the Crimea. He took part in the Russo-Swedish determination of an arc of the meridian, visiting Spitsbergen for this purpose. A valuable new method of determining the flexure of transit-circles was introduced at Pulkova under his auspices. In conjunction with Dr. Hough he formed a list of stars to be used as fundamentals in astrographical reductions, and arranged that the "Star Corrections" for several hundreds of them should be printed at Pulkova.

The British observers who visited Russia for the eclipse of August, 1914, remember with gratitude his kind help in the difficulties which arose from the outbreak of war.

NOTES.

WE notice with much regret the announcement, in the *Times* of November 6, that Prof. H. H. W. Pearson, Harry Bolus professor of botany, South African College, Cape Town, died on November 3, at Mount Royal Hospital, Wynberg, at forty-six years of age.

THE many friends of Major T. Edgeworth David, professor of geology in the University of Sydney, will be delighted to learn that he has recovered from the effects of serious injuries received while conducting mining operations in northern France, and hopes shortly to rejoin his regiment.

IN answer to a question by Mr. Montague Barlow in the House of Commons on October 26, suggesting the adoption of the metric system of weights and measures, the Prime Minister stated that he was aware that the proposal to adopt the metric system had a certain measure of support, but that it was difficult to say how far this was general. He understood that the attention of Lord Balfour of Burleigh's committee had already been directed to the subject. This reply will probably not be regarded as encouraging by those who are of opinion that the immediate obligatory adoption of the metric system is urgently necessary in order that we may be fully prepared, when the war is over, to cope with competition in foreign trade. Though the metric system has been legal for all purposes of internal and export trade for nearly twenty years, very little advantage has so far been taken of it by the trading community generally; while the large body of retailers are still completely ignorant of the nomenclature and equivalents of the system.

EMERITUS PROFESSOR JOHN FERGUSON, who last year resigned the Regius chair of chemistry in the University of Glasgow, died, after a very brief illness, on November 3. Prof. Ferguson was in his eightieth year, and had held the chair since 1874. His connection with the University had been continuous, as student, assistant, and member of the Senate, for well over sixty years. Among his pupils or assistants were Prof. J. M. Thomson, Sir William Ramsay, Sir J. J. Dobbie, Prof. G. Henderson, Prof. W. Lang, Prof. Carrick Anderson, Prof. M. A Parker, Dr. A. W. Stewart, and other distinguished chemists. He had made many contributions to the history of chemistry, to bibliography, and to archæology, the most notable being his "Bibliotheca Chemica," published in two quarto volumes in 1906. He was an LL.D. of St. Andrews, and an honorary member of many British and foreign learned societies, including the Imperial Military Academy of Medicine, Petrograd, and the Société Francaise d'Archéologie. Last year, on his retirement from the chair, he was appointed honorary curator of the books and MSS. in the Hunterian Library, on the catalogue of which he was engaged at the time of his death. On many occasions he was sent to represent the university at centenary and other academic celebrations at home and on the Continent. His fine presence and courtly manner made him an acceptable delegate on such occasions. He had accumulated a vast collection of medieval books and manuscripts dealing with alchemy, natural magic, "secrets," and "origins." It is to be hoped that the collection will be kept together for the benefit of students of scientific history.

THE leading article in *Engineering* for November 3 is devoted to a discussion on the status of the engineer. The divorce of the engineer from public affairs, and the minor place he occupies in popular estimation, are causing disquietude on the other side of the Atlantic, where a case has occurred recently of a lawyer having been appointed to the post of county engineer because it was held that the post must be filled by a politician. The actual engineering work has therefore to be done by deputy. This is characteristic of our own national services, where it has been common to appoint clerks as heads of departments, even when these are concerned with highly technical matters. The official view is that expert knowledge is unnecessary in such cases, as trained assistants can be secured to do the work, whilst the nominal chief signs the inevitable forms. As Lord Sydenham puts it, the results of such a system are that the man who knows all about some subject has to refer to, and be overruled by, someone who knows nothing whatever about it. The working of the system as exemplified during the recent times of stress has been more instructive than edifying.

WE record with much regret the death on November 5, in his forty-ninth year, of Prof. H. M. Waynforth, professor of engineering, King's College, University of London.

PROF. G. CAREY FOSTER, a past president of the Institution of Electrical Engineers, has been elected by the council an honorary member of the institution.

THE opening of the next annual meetings of the Institution of Naval Architects has been fixed for Wednesday, March 28, 1917.

DR. D. F. LINCOLN, a former secretary of the American Social Science Association, died recently in Boston at the age of seventy-five. He was the author of "School and Industrial Hygiene," "Electro-Therapeutics," "Hygienic Physiology," and "Sanity of Mind."

WE regret to note that *Engineering* for November 3 records the death of Dr. C. A. Harrison at the age of sixty-eight. Dr. Harrison was for many years engineer-in-chief to the North-Eastern Railway; the structures which remain as monuments to his skill are principally bridges. He was for a time a member of the council of the Institution of Civil Engineers, and received the degree of D.Sc. at Newcastle in 1906, as a tribute of honour to his work in connection with the King Edward Bridge.

THE death on October 29 of Prof. O. V. Muller is announced. Prof. Muller was professor of history and political economy at Elphinstone College, Bombay. A *Times* correspondent writes that during the plague in Bombay he laboured hard to persuade the plague-stricken to allow themselves to be taken to hospital, and for his efforts towards stamping out the plague he received the Kaisar-i-Hind medal. Prof. Muller was a keen archæologist, and formed valuable collections of Danish, English, and Indian stone and bronze antiquities.

THE death is announced, in his seventy-first year, of Mr. V. G. Bogue, a leading American engineer. He was a member of a commission appointed by President Harrison to investigate the methods for improving the navigation of the Columbia River, and acted as consulting engineer for the Government of New Zealand on the proposed railway across South Island. He prepared the plan and report for Greater Seattle and for the harbour of Tacoma. While employed from 1880 to 1886 as an assistant engineer in the construction of the Northern Pacific Railway, Mr. Bogue discovered the Stampede Pass in the Cascade Mountains. From 1886 to 1891 he was chief engineer of the Union Pacific.

WE regret to learn of the death of Lance-Corpl. J. W. Hart, who, having volunteered in the early days of the war, was killed on September 15, while taking part in the first wave of an attack against the enemy trenches. Mr. J. Hart received his early training at University College, Reading, and showed the greatest promise as a student. He obtained the diploma in horticulture at Reading, and afterwards the B.Sc. (war) degree of London University. At the beginning of the war he held the post of horticultural assistant at Bedford College, London, and was in charge of the botany garden, the successful development of which was largely due to his skill and energy. Mr. Hart was no militarist; hating the wastefulness of war, he abandoned the constructive work he had at heart for that greater cause for which he believed his country to be fighting. His death will be keenly felt by the many friends to whom his manly, enthusiastic, and cheerful outlook on life had endeared him, while scientific horticulture has lost one of its most promising adherents.

A QUOTATION in the *Morning Post* from the *Gazette de Hollande* emphasises the use made in Germany of geological advice in trench warfare, and Prof. Salomon, of Heidelberg, is said to have urged the formation of a special organisation of geologists in connection with the Army. It is probably no secret that excellent use has been made by the British military authorities of our own Geological Survey staff, members of which have been of technical assistance in fields as wide apart as the deeply dissected strata of Gallipoli and the undulating Cretaceous expanses of the Paris-Brussels basin. The geologist has been found of service in military mining as well as in questions of water supply, and the memoir recently issued by the Geological Survey on "Sources of Temporary Water Supply in the South of England and Neighbouring Parts of the Continent" (see NATURE, vol. xcv., p. 244) was drawn up specially to meet the needs of camps.

A LECTURE was delivered at the Royal Society of Medicine on October 31 by Dr. Sherman, of Pittsburg, on the method of sterilising wounds introduced by Dr. Carrel, the well-known American surgeon. The method consists in opening up the wound so far as necessary to reach every part of it, and rubber tubes are passed into all the recesses, and are kept in place by gauze packing. An antiseptic solution is then allowed to flow from a container, and by means of the tubes flushes out every part of the wound. This is done every two hours, and the wound is re-dressed every day. The effect is very striking, and the wound is rendered completely sterile in a few days. The antiseptic solution employed by Dr. Carrel is Dakins's solution somewhat modified; this was finally adopted after a trial of 200 different antiseptics. The solution consists of chloride of lime, sodium carbonate, and sodium bicarbonate in ordinary water compounded in a particular manner, details of which will be found in the *Lancet* of November 4, p. 800. It is claimed that by this method of treatment the healing of wounds is greatly accelerated.

DR. C. D. WALCOTT, secretary of the Smithsonian Institution, and Mrs. Walcott have just returned to Washington, D.C., after several months' field work on the Continental Divide, which forms the boundary line between Alberta and British Columbia south of the Canadian Pacific Railway, studying the Cambrian rocks. Mrs. Walcott visited Glacier, British Columbia, where she measured the position of two large glaciers, and determined that the front ice foot, in each case, had retreated at the rate of 100 ft. a year during the past two years. Steel plates were placed on the ice on the present surveyed boundary lines. The plates will be buried beneath the winter snows, but, since their positions are relatively low as to altitude, the snow will be melted off next summer, and their locations then will indicate the amount of forward flow of ice during the year. Mrs. Walcott's studies show that the ice has been steadily retreating during the past six years, and her measurements agree with observations made in Alaska. During the field work a large number of photographs were taken, including a dozen or more panoramic views, exposures being made on continuous films 8 ft. in length.

LIEUT. JOHN HANDYSIDE, who fell in one of the recent advances on the Somme, at the age of thirty-five, was a distinguished graduate of Edinburgh and Oxford, and since 1912 had been lecturer in philosophy in the University of Liverpool. At Edinburgh he carried off all the honours open to students of philosophy, and at Oxford, after taking a first in Greats, he was elected a fellow of St. John's College. On the completion of his Oxford course he returned to Edinburgh, and acted for three years as assistant to Prof. Pringle-Pattison. After his appointment to Liverpool, the long illness of Prof. Mair threw upon him the chief responsibility for the work of the philosophical department. It was a severe test, and Mr. Handyside proved himself a successful teacher and a most helpful colleague. In 1915 he was granted leave of absence for military service, and obtained a commission in the 16th Batt. King's Liverpool Regiment. He had been between three and four months at the front, and was mortally wounded while rallying his men during an attack. His engrossment in teaching work during the last years prevented him from writing much, but he had completed a translation of two of Kant's smaller treatises, which he intended to equip with a critical introduction, and he had also in view some independent work in ethics. It is hoped, therefore, that some specimen of his work may yet be published.

QUICKLY after Ehrlich and Metchnikoff, his fellow Jews, has passed Prof. Albert Neisser, of Breslau, whose name will ever be associated with theirs in the history of the scientific advance against venereal disease. He was only twenty-four when, in 1879, he identified the gonococcus, a markedly characteristic form of diplococcus which is the cause of gonorrhœa. He devoted all his later years to the study of venereal disease, contributing largely to the biochemical tests for the identification of syphilitic infection, and being the founder, fourteen years ago, of the German society which corresponds to our National Council for Combating Venereal Diseases, founded in London last year. Though the discovery of the gonococcus has not led, as yet, to the construction of any direct chemical remedy, such as salvarsan in the case of syphilis, or to the production of an antitoxin, as in the cases of diphtheria and tetanus, Neisser's discovery has nevertheless been of incalculable value in the treatment, the identification, and, in our own times, the prophylaxis of the disease. Thanks to him, the gonorrhœal nature of *ophthalmia neonatorum* has been demonstrated, and the dependence of many cases of rheumatism or arthritis upon the same organism; while gynæcology tells us that at least one-half of all the cases where a major abdominal operation is required in women are due to gonorrhœal infection, which is, in fact, the great steriliser of femininity, and a leading enemy of the birth-rate everywhere. Thanks also to Neisser, the treatment of the disease has been vastly improved, the introduction of protargol being due to him, and his warnings and the microscopic resources which we owe to him enable us to know that the disease is still present in many cases where it would otherwise have been ignored.

AT a time when it is strongly urged that more capital must be employed in food production, any method that will enable the farmer to calculate the risk of his crops being destroyed by unfavourable weather conditions deserves careful study. In the July issue of the *Geographical Review* (New York) Messrs. W. G. Reed and H. R. Tolley show how the risk for a crop which is in a condition to be damaged by frost between any two dates in spring and autumn may be computed if sufficient observations for that district are available. Using the well-known method of mean squares, "standard deviation" figures are calculated for 569 stations in the United States. These constants are a measure of the departure from the average dates of the last killing frost of spring and the first killing frost of autumn. Naturally these standard deviations are lowest for the central areas and highest for maritime States like Florida and California. If a crop is in a condition to be damaged on the average date of the last killing frost in spring, the risk is 50 per cent. In the case of a station with a standard deviation of 14·4 the risk falls to 10 per cent. nineteen days later than the average date. By combining the risks in spring and autumn the total risk may be computed for a crop which is exposed to both dangers. The risk of loss which may be profitably carried naturally varies with the crop and the economic conditions. Given the necessary data, the authors believe that risks from weather conditions other than frost may be computed in this way.

IN the Proceedings of the American Philosophical Society (vol. lv., No. 3) Dr. Raymond Pearl describes some interesting experiments on the effect of continued administration of alcohol to the domestic fowl. Comparing the control group and the alcoholised group, he finds that there is no evidence that specific germinal changes have been induced by the alcohol treatment, at least in those germ-cells which produced zygotes, and that the germ-cells which produced zygotes were not in any respect deleteriously affected. Although the results are apparently in contradiction to those of some observers with mammals, the writer believes that the contradiction is more apparent than real. The discrepancy, he argues, is fundamentally due to a difference in the resistance of the germ-cells to alcohol.

DR. CARL HANSEN-OSTENFELD has published (Mem. Acad. Roy. Copenhagen, Sect. Sc., 8 ser., t. ii., No. 2, 1916) an account of the Protozoa found in the samples of plankton taken in Danish seas from 1898 to 1901. Some of these organisms, *e.g.* ciliates of the genus Tintinnopsis, are indigenous, but the majority, *e.g.* the two recorded species of Heliozoa, several species of Radiolaria and of Tintinnoid ciliates, appear to have been carried by currents from the North Sea into the Skager Rak or the Cattegat, but it is evident that most of them do not penetrate far, as they meet with water of low salinity from the Baltic, which is inimical to them. Noctiluca—a globular Cystoflagellate, about 1 mm. in diameter, and well known for its phosphorescence—is occasionally present in enormous quantities in Limfjord, but cannot maintain itself inside the Skager Rak; it disappears each winter and is reintroduced in the following autumn by the "Jutland current." A few planktonic organisms are carried into the Danish area by the outgoing current from the Baltic. One of these—*Ebria tripartita*, referred to a new order Pyritoflagellata, near the Silicoflagellata—is found to be capable of living under wide variations of salinity (4 per mille to 25 per mille). A short account is given of the occurrence of Vampyrella (parasitic in the diatom, *Chaetoceras boreale*) and of Hyalosaccus (parasitic in Ceratium), both organisms of uncertain affinities. A list is appended of the phytoplankton and protozoa recorded from Danish waters.

SEVERAL articles dealing with different aspects of the geography of New York occupy the September number of the *Geographical Review* (vol. ii., No. 3). Mr. Ellsworth Huntington, writing on the water barriers of New York City, shows the important part that ferries and bridges play in the economy of the city, and the inevitable tendency towards crowding that arises from the island site. This results on one hand in "sky-scrapers" and high rents, and on the other in weakened health and nervous strain. Another article, by Mr. E. P. Goodrich, on some problems incident to the growth of New York City, is particularly valuable on account of the number of maps reproduced. Although these are necessarily much reduced, and in cases a little difficult to decipher, they illustrate many important considerations in town planning and municipal organisation which are essentially questions within the province of the geographer. Some of these maps incorporate useful suggestions for other towns.

THE recent formation of a conference of representatives of electric power supply companies to consider the best methods of linking up generating stations in the Greater London area, and the formation of a National Power Supply Joint Committee covering a still wider area, both point to a greater uniformity in orders and rules for the regulation of electric supply in the near future. It is to the interest of neither consumer nor supply company that a piece of apparatus which is pronounced dangerous or inefficient on one side of the street should be deemed adequate on the other side. That the same desire for greater uniformity in the rules for the regulation of electric supply is felt at the present time in America is shown by the recent issue by the Bureau of Standards of a circular of 260 pages dealing with the most important of the factors which determine the safety and efficiency of electric supply. It has been drawn up after conference with the supply companies and others concerned, contains rules and regulations suitable for companies under either State or municipal control, and gives specifications for the approval of the various types of electricity meters.

THE appendix to the annual report of the Board of Regents of the Smithsonian Institution for the year ending June 30, 1915, as usual, consists of a selection of miscellaneous memoirs of interest to all engaged in the promotion of knowledge. The articles for the most part are those of the year 1915. Many are translations into English of foreign contributions to science, and among these may be mentioned the following:—A review of astronomy for the year 1913, by M. P. Puiseux, of the Paris Observatory; the earthquake in the Marsica, Central Italy, by M. Ernesto Mancini, secretary of the Royal Academy of the Lincei; Atlantis, by M. Pierre Termier, director of the service of the Geologic Chart of France; construction of insect nests, by Prof. Y. Sjostedt, of the Royal Museum of Natural History, Stockholm; excavations at Tell-El-Amarna, Egypt, in 1913–14, Herr Ludwig Borchardt; and vaccines, by Prof. L. Roger, of the Paris University. The original contributions to the report include:—Evidences of primitive life, by Dr. C. D. Walcott, secretary to the Smithsonian Institution; olden-time knowledge of Hippocampus, by Dr. C. R. Eastman, of the American Museum of Natural History; progress in the reclamation of arid lands in the Western United States, by Mr. J. B. Beadle, of the U.S. Reclamation Service. The appendix, as is customary, is illustrated by a profusion of beautiful plates.

THE recent issue of the *Central*—the organ of the Old Students' Association of the City and Guilds (Engineering) College, South Kensington—is virtually a special number, in which some of Prof. Armstrong's old students have sought to put on record their impressions of the work of the Chemical Department of the college during the period from 1884 to 1914. The most remarkable feature of the record is perhaps the great variety of the subjects in which work of real value was done in a department which was always small in numbers, but for that very reason received an intensive cultivation which would have been impossible in a larger school or department. The writers include Prof. Pope, Mr. W. M. Heller, Prof. Compton, Dr. Lowry, Prof. Lapworth, Sir Henry Miers, Prof. Wynne, and Dr. Eyre, and Prof. Armstrong himself has added some "Personal Notes on the Origin and Development of the Chemical School at the Central." The chemical subjects touched upon in the record will be familiar enough to those who have followed the developments of chemical science during the past thirty years, but an even wider circle will welcome Mr. Heller's account of the "Reform in Education" with which Prof. Armstrong's name will always be associated. Sir Henry Miers has given an account of the school of crystallography at the Central, probably the only school in which the subject was taught regularly to all matriculated chemical students, and Dr. Eyre describes the biological investigations which became an important feature of the work of the department from 1900 onwards. The periodical contains an excellent photograph of Prof. Armstrong on holiday in 1909, and a list of careers of the students who passed through the chemical laboratory.

MR. C. BAKER, 244 High Holborn, London, has issued his October list of second-hand scientific apparatus. The list contains the usual large assortment of instruments, and all are guaranteed to be in perfect working order before being sent out. In view of the comparative scarcity of new apparatus owing to the demands of the war on manufacturers, this catalogue deserves the careful attention of science lecturers and others. The 1500 pieces of apparatus are for sale or, with some exceptions, for hire. The catalogue deals with microscopes and microscopic apparatus, surveying and drawing instruments, telescopes and accessories, spectroscopes, and a great variety of other physical apparatus.

MESSRS. H. SOTHERAN AND CO. (Strand and Piccadilly) have just issued the sixth and last part of their catalogue—"Bibliotheca Reuteriana" of modern standard works on mathematics, astronomy, physics, chemistry, engineering, crystallography, and meteorology, forming the final supplement to the "Bibliotheca Chemico-Mathematica." Messrs. Sotheran announce that after the war they will publish a library illustrated edition on fine paper of the "Bibliotheca Chemico-Mathematica" complete. It will contain about 125 full-page plates and an analytical subject-index.

MESSRS. J. WHELDON AND CO., 38 Great Queen Street, W.C., have just published No. 76 of the new series of their catalogue. It deals with the journals and transactions of many scientific societies, and with English and foreign literary and scientific periodicals. There are also addenda giving particulars of remainders of books relating to natural history. The catalogue should be of interest and service to many students of science.

MR. F. EDWARDS, High Street, Marylebone, has recently circulated a very interesting illustrated catalogue of autograph letters, manuscripts, and historical documents. A section of the catalogue is composed of documents relating to the United States, Canada, and the West Indies.

THE two following volumes are in preparation, among others, for appearance in the "University of Chicago Science Series" (*Cambridge University Press*):—"A Factorial Theory of Evolution," by W. L. Tower, and "Chemical Signs of Life," by S. Tashiro.

OUR ASTRONOMICAL COLUMN.

THE RADIAL VELOCITY OF β URSÆ MAJORIS.—From observations of the radial velocity made at Potsdam some years ago it was concluded by Ludendorff that β Ursæ Majoris was a spectroscopic binary with a period of 27·16 days and total range of 15½ km./sec. Subsequent observations made at the Lick Observatory, however, gave a range of velocity no greater than that to be expected in the determinations for a constant-velocity star of type A. Further interest in the question was aroused last year by Guthnick and Prager's observations of the star with a photo-electric photometer, from which a variation through 0·02 mag. in a period of 0·3122 day was deduced; the Potsdam radial velocity values were thought to be consistent with this period. A further investigation of the radial velocity, with special reference to short-period changes, has since been undertaken at Mt. Hamilton (Lick Observatory Bulletin No. 284). Thirty-six plates were taken on three nights during February, 1916, but, as in the case of the earlier photographs, these do not appear to indicate a variation through any appreciable or dependable range of velocities. Prof. Campbell hopes that someone with less observing opportunity and more opportunity for computation will make a further effort to discover a periodicity of very small amplitude. The plates are available for loan to any experienced measurer of spectrograms who may have a plan for remeasuring them.

RADIAL MOTION IN SUN-SPOTS.—Mr. Evershed has recently reported on some further investigations of the radial motion in sun-spots discovered by him in 1909 (Kodaikanal Observatory Bulletin 51). Improved results have been obtained by the use of instruments which reduced the times of exposure, and by working only under the best conditions as to definition of the spot image. It now appears that the radial motion displacement may be very unequal at equal distances from the umbra, and the two spots investigated showed larger displacements on the limb side than on the side towards the centre. There is usually an acceleration of velocity from the umbra to the outer limits of the penumbra, and then a sudden fall to zero, or to a lesser speed which diminishes to zero at some distance outside the spot. The radial movement may amount to as much as 4 km./sec. at one edge of the penumbra for lines of intensity 0 and 1 in large spots. The diminution of the indicated velocity with increased intensity, which was found by St. John, and attributed by him to differences of effective level, is confirmed by the new measures. In opposition to St. John, however, no difference was found for enhanced lines of iron as compared with the arc lines of like intensity. Mr. Evershed further concludes that while movements at right angles to the radial motion may occur in the penumbræ, rotational movement is not a constant feature.

WOLF-RAYET BANDS IN THE NUCLEI OF NEBULÆ.—In continuation of the work of Wright, the nuclei of three additional planetary nebulæ have been found by G. F. Paddock to give the Wolf-Rayet type of spectrum (Lick Observatory Bulletin, No. 284). The nucleus of N.G.C. 6826 shows a fairly bright band at 4686, and a fainter band at 4657, which is not given in Campbell's list of Wolf-Rayet lines. In N.G.C. 418$_2$ the band 4686 is faintly seen in the nucleus, while that at 4650 is fairly bright. Four bright bands were found in the nucleus of N.G.C. 40, namely:—

Wave-length		Width		Intensity
4862·2	...	14 A.	...	Faint.
4788·3	...	13 A.	...	Faint.
4687·4	...	15 A.	...	Fairly strong.
4652·1	...	22 A.	...	Very strong.

The band at 4652 is strongest near its violet edge, and seems to shade off towards the red. That at 4862 corresponds to H_β.

BARNARD'S HIGH PROPER-MOTION STAR.—Some interesting details relating to the discovery of the star with the largest known proper motion have been given by Prof. Barnard (*Popular Astronomy*, vol. xlvii., p. 504). The star was shown on plates taken in 1894, 1904, 1907, and 1916, and the images were so far apart as to seem to represent different objects, which might be new or variable stars. It was found, however, that all the images were in a straight line, and that the different photographs could be reconciled by supposing the images to have been made by a star with an annual proper motion of about 10″, in a direction almost exactly north. At the epoch 1916·423 the R.A. of the star was 17h. 53m. 43·60s., and the declination $+4^\circ\ 27'\ 48''$; it was 9·1s. following, and 51″ north of B.D. $+4^\circ$ 3560. The star is situated in the northern part of Ophiuchus, and is of about the 10th visual magnitude. The movement may easily be detected in the course of a few months, and photographs and charts are given for the benefit of those desiring to observe the star.

Mr. Adams has found that the type of spectrum is M*b*, and that the star is approaching the earth with a velocity of 91 km./sec. The relative intensities of certain spectral lines suggest a parallax of 0·2″, and it would follow from this that the star's real velocity in space is 260 km./sec.

A CATALOGUE OF METEORITES.—An illustrated handbook and descriptive catalogue of the meteorite collections in the United States National Museum, prepared by Dr. G. P. Merrill, has recently been published by the Government Printing Office, Washington. Though the handbook is intended primarily for the general public, it is so arranged as to provide also for the needs of the student and investigator. At the beginning of the present year the collection included 329 falls and finds, and an equal number of thin sections for microscopic study. There is a brief introduction, giving an interesting account of the characteristics of meteorites, and of the system of classification, following in the main that proposed by Brezina. In a large number of cases the results of analyses are given.